

Plastic shrinkage cracking of concrete in hot-arid environments

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Abstract: Cracking of concrete due to plastic shrinkage is frequently noted in hot weather conditions. These cracks form focal points for other forms of concrete deterioration by allowing moisture and oxygen to diffuse to the reinforcing steel. They are formed when the rate of evaporation of moisture from the concrete surface is more than the rate of bleeding. Since the mix constituents control the rate of bleeding, it is apparent that plastic shrinkage cracking can be minimized by choosing appropriate mix design and adopting other necessary precautions during placement and consolidation of concrete. This paper provides a brief review of literature pertaining to plastic shrinkage cracking of concrete, particularly in hot and arid environments. This literature review is supplemented by the results of studies conducted by the authors on this important, and yet scantily studied, concrete deterioration phenomenon. It was noted that both environmental conditions and concrete mix variables influence plastic shrinkage cracking of concrete. One of the important findings of this study was that plastic shrinkage cracking was the least in a lean-stiff concrete mix, such as that made with a cement content of 300 kg/m³ and water-cement ratio of 0.40. Further, plastic shrinkage cracking in blended cement concretes was more than that in plain cement concretes. Therefore, appropriate precautions should be taken when using these cements to utilize the technological benefits accruing out of their use.